

Appl. No. 10/781,076
Amtd. Dated March 21, 2005
Reply to Office Action of November 22, 2004

REMARKS

Claims 1-19 are pending in the present Application, and claims 5-6 and 14-15 have been withdrawn from consideration. Claims 1, 10, and 19 have been amended. Support for the amendment can be found in the entire application, for example, page 9, lines 2-3 of the specification. No new matter has been added by the amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-4, 7-13, and 16-19 stand rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over Gates, US 5,796,121 (hereinafter "Gates") in view of Pieterse Koen et al. (Polymer Preprint 40, pp. 404-405, 1999) (hereinafter "Pieterse Koen") for the reasons stated on pages on 2-3 of the Office Action. Applicants respectfully traverse the rejection.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Claim 1 is an organic transistor, comprising: an organic layer inserted between a p-type organic semi-conducting layer and a source or drain electrode, wherein the organic layer includes at least one compound represented by Chemical Formula I. In claim 1, the organic layer including at least one compound represented by Chemical Formula I is inserted between the p-type organic semi-conducting layer and a source or drain electrode. Because the organic layer, being employed as a hole-injecting layer, improves the ohmic contact between the p-type organic semi-conducting layer and the source or drain electrode, the claimed invention show high performance of field-effect even when a low work function metal, which cannot be used in

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a conventional p-type transistor, is used as the source or drain electrode.

In contrary, Col. 4, lines 25-28 and 34-35 of Gates teach that layer (60) is a semiconducting channel layer, here hydrogenated amorphous Si (a-Si:H), and contact layer (64) is an n-type semiconductor, preferably a-Si:H doped with phosphorus. That is, Gates teaches n-type inorganic semiconductor, rather than p-type organic semiconductor. Therefore, Gates does not teach the element "a p-type organic semi-conducting layer", as recited in claim 1. This deficiency is not cured by Pieterse Koen, because Pieterse Koen simply teaches n-type semiconducting materials having the compound represented by Chemical Formula I. Thus, neither Gates nor Pieterse Koen teaches the element "a p-type organic semi-conducting layer", as recited in claim 1.

Further, there is no motivation for the skilled artisan to modify combined references. Col. 2, lines 46-49 of Gates, for example, discloses that the invention disclosed in Gates provides solutions to the problems occurred in TFT on a plastic substrate. Gates, however, fails to teach or suggest inserting the organic layer between the p-type organic semi-conducting layer and the source or drain electrode. Pieterse Koen simply discloses preparing discotic liquid crystalline n-type semi-conducting materials. Therefore, the skilled artisan cannot be motivated to modify Gates and Pieterse Koen to arrive at the claimed invention, because neither Gates nor Pieterse Koen teaches or suggests inserting the organic layer between the p-type organic semi-conducting layer and the source or drain electrode.

Even assumed that Gates and Pieterse Koen is combined, the proposed modification does not have a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. A n-type semiconductor transistor show a high performance of field-effect even when a low work function metal such as Al is employed as a source or drain electrode, because the work function of the metal needs to be close the LUMO (Lowest Unoccupied Molecular Orbital) of the n-type semiconductor material. A p-type semiconductor transistor, however, shows a low performance of the field-effect with the low work function electrode, because the work function of the electrode needs to be close the HOMO (Highest Occupied Molecular Orbital) of the p-type semiconductor material. The claimed transistor, however, has the high performance of field-effect even when the low work

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function metal is employed as a source or drain electrode, which is unexpected result and is not shown in Gates or Pieterse Koen. Example 2 of the application, for example, shows that the claimed transistor has high performance of field-effect when Al having a low work function is used as source/drain electrode. Therefore, neither Neither Gates nor Pieterse Koen has a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made.

For at least the reasons stated above, the combination of Gates and Pieterse Koen does not render claim 1 obvious. Since they contain similar features, claims 10 and 19 are believed to be patentable over the combination for at least the reasons given for claim 1. Claims 2-4 and 7-9 depend from claim 1, and claims 11-13 and 16-18 depend from claim 10. These dependent claims are believed to be allowable due to their dependency on claims 1 and 10.

Conclusion

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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